CURRENT NACA REPORTS

NACA Rept. 1179

A NOTE ON SECONDARY FLOW IN ROTATING RADIAL CHANNELS. James J. Kramer and John D. Stanitz. 1954. ii, 12p. diagrs. (NACA Rept. 1179. Formerly TN 3013)

A general vector differential equation for the vorticity component parallel to a streamline is derived for steady, nonviscous and incompressible flow in a rotating system. This equation is then simplified by restricting it to rotating radial channels and by making further simplifying assumptions. This simplified equation is used to solve for the secondary vorticity, the vorticity component parallel to the streamline, in three special cases involving different streamtube geometries; the results are presented in a series of figures. The secondary vorticity is shown to decrease with decreased absolute angular velocity of the fluid, decreased inlet total-pressure gradient, decreased length of relative flow path, and increased relative velocity.

NACA RM E54D13

A DROP TEST FOR THE EVALUATION OF THE IMPACT STRENGTH OF CERMETS. B. Pinkel, G. C. Deutsch and N. H. Katz. March 1955. 8p. diagrs., photo. (NACA RM E54D13)

The development of brittle high-temperature materials has focused attention on the impact resistance of these materials. This report describes a device for measuring very small values of impact resistance both at norm and elevated temperatures. The device is believed to eliminate extraneous energies, such as the "toss energy" from the impact strength. The method of testing consists of dropping a hammer from increasing heights so that it strikes near the free end of a cantilever beam specimen. The energy of the hammer when the specimen fractures is the impact strength. Representative values of the impact strengths of several high-temperature materials are given.

NACA TM 1382

STEADY PROPERLY-BANKED TURNS OF TURBOJET-PROPELLED AIRPLANES. (La Virata Corretta Stazionaria Degli Aeroplani Azionati da Turboreattori). Angelo Miele. March 1955. 33p. diagrs., tab. (NACA TM 1382. Trans. from Rivista Aeronautica, v.27, no.1, 1951, p.23-35)

The problem of a jet propelled airplane in a steady turn is analyzed for the case of parabolic and non-parabolic aircraft polars. A general solution is obtained and the special cases of maximum banked turn, maximum angular velocity turn and minimum radius turn are then investigated. A brief comparison of the jet and reciprocating propelled airplane is made. Compressibility effects are considered.

NACA TN 3336

REVIEW OF EXPERIMENTAL INVESTIGATIONS OF LIQUID-METAL HEAT TRANSFER. Bernard Lubarsky and Samuel J. Kaufmann. March 1955. 115p. diagrs., tab. (NACA TN 3336)

Experimental data of various investigators of liquid-metal heat-transfer characteristics were reevaluated using as consistent assumptions and methods as possible and then compared with each other and with theoretical results. The reevaluated data for both local fully developed and average Nusselt numbers in the turbulent flow region were found still to have considerable spread, with the bulk of the data being lower than predicted by existing analysis. An equation based on empirical grounds which represents most of the fully developed heat-transfer data is

$Nu = 0.625 \, Pe^{0.4}$ where Nu represents the Nusselt number and Pe the Peclet number. The theoretical prediction of the heat transfer in the entrance region was found to give lower values, in most cases, than those found in the experimental work.

NACA TN 3338

A DYE-TRACER TECHNIQUE FOR EXPERIMENTALLY OBTAINING IMPINGEMENT CHARACTERISTICS OF ARBITRARY BODIES AND A METHOD FOR DETERMINING DROPLET SIZE DISTRIBUTION. Uwe H. von Glahn, Thomas F. Gelder and William H. Smyers, Jr. March 1955. 73p. diagrs., photos., tab. (NACA TN 3338)

A dye-tracer technique has been developed from which the droplet impingement characteristics of bodies can be determined by colorimetric analysis. The technique is applicable to various wind tunnels provided the humidity of the air stream can be maintained near saturation. A method is also presented whereby the droplet size distribution of the impinging cloud may be determined by relating the experimental impingement characteristics of a body to the theoretical trajectory results for the same body.

NACA TN 3359

AN INVESTIGATION OF DRAINS DISCHARGING
LIQUID INTO SUBSONIC AND TRANSONIC STREAMS.
Allen R. Vick and Frank V. Silhan. March 1955.
54p. diagrs., photos., tab. (NACA TN 3359)

Results of an investigation on the characteristics of
drains discharging liquid into an airstream at Mach
numbers from 0.5 to 1.3 are presented in the form of
surface stain patterns, schlieren photographs of the
flow, and drag measurements for drains of circular,
elliptical, and airfoil cross-sectional shapes. Var-
iables whose influence have been investigated include
Mach number, liquid reservoir pressure, drain
extension, angle of sweep, and end shape. Vent
pressure data are presented as differentials between
the free-stream and drain static pressure for various
tube configurations.

NACA TN 3362

ESTIMATES OF PROBABILITY DISTRIBUTION OF
ROOT-MEAN-SQUARE GUST VELOCITY OF
ATMOSPHERIC TURBULENCE FROM OPERATION-
AL GUST-LOAD DATA BY RANDOM-PROCESS
THEORY. Harry Press, May T. Meadows and Ivan
Hadlock. March 1955. 48p. diagrs., 4 tabs.
(NACA TN 3362)

Relations are derived between the peak gust loads
experienced in airplane operations and the probabil-
ity distribution of root-mean-square gust velocity.
These relations are applied in the analysis of opera-
tional data on peak gust accelerations to derive esti-
mates of the probability distribution of root-mean-
square gust velocity. The application of these
results to gust load calculations for other airplane
operations is also considered briefly.

NACA TN 3365

AN ANALYSIS OF ACCELERATIONS, AIRSPEEDS,
AND GUST VELOCITIES FROM THREE COMMER-
CIAL OPERATIONS OF ONE TYPE OF MEDIUM-
ALTITUDE TRANSPORT AIRPLANE. Thomas L.
Coleman, Martin R. Copp, Walter G. Walker and
Jerome N. Engel. March 1955. 31p. diagrs.,
4 tabs. (NACA TN 3365)

Time-history data obtained by the NACA VGH re-
corder from one model of a four-engine civil trans-
port airplane during operations on three routes are
analyzed to determine the magnitude and frequency
of occurrence of gust velocities, gust and maneuver
accelerations, and the associated airspeeds. Varia-
tions of the gusts and gust accelerations with route
and flight condition are indicated. Estimates of the
overall gust and gust-load histories for extended
operations on one route are obtained by supplement-
ing the data from the NACA VHG recorder with
available data from the NACA V-G recorder.

NACA TN 3374

TURBULENT-HEAT-TRANSFER MEASUREMENTS
AT A MACH NUMBER OF 2.06. Maurice J.
Brevoort and Bernard Rashis. March 1955. 20p.
diagrs., tab. (NACA TN 3374)

An axially symmetric annular nozzle was used to ob-
tain essentially flat-plate data on turbulent heat-
transfer coefficients and temperature-recovery fac-
tors. The test results of this paper are for Mach
number 2.06 and for a Reynolds number range of
1.7×10^6 to 8.8×10^7. The heat-transfer-coefficient
results are in good agreement with theoretical analy-
ses and the experimental results of the tests of V-2
rockets. The recovery factors are approximately 0.5
percent lower than data for a Mach number of 2.4.

NACA TN 3375

A THEORY FOR PREDICTING THE FLOW OF REAL
GASES IN SHOCK TUBES WITH EXPERIMENTAL
VERIFICATION. Robert L. Trimpi and Nathaniel B.
Cohen. March 1955. 69p. diagrs., photo.
(NACA TN 3375)

The nonlinear characteristic differential equations
applicable to a quasi-one-dimensional unsteady chan-
nel flow with friction and heat transfer are linearized
and integrated in functional form for the particular
study of small perturbations from ideal shock-tube
flows. If the equivalence of unsteady-flow and
steady-flow boundary layers is assumed, the theory,
evaluated with an equivalent steady-flow turbulent-
boundary-layer skin-friction coefficient, predicts
that the shock attenuates with distance and that aver-
age values of static pressure, velocity, density, and
Mach number in the hot gas increase with time at a
fixed position, while average sonic speed is simulta-
neously decreasing with time. Experimental
measurements of the shock attenuation with distance
and static-pressure variation with time at a fixed
position for diaphragm pressure ratios from approx-
imately 4 to 18 gave good agreement with the theore-
tical predictions.

NACA TN 3377

FLIGHT MEASUREMENTS OF THE VELOCITY
DISTRIBUTION AND PERSISTENCE OF THE
TRAILING VORTICES OF AN AIRPLANE.
Christopher C. Kraft, Jr. March 1955. 32p.
diagrs., photos., tab. (NACA TN 3377)

Measurements have been made in flight of the veloc-
ity distribution and persistence of the trailing vor-
tices of a propeller-driven fighter-type airplane.
The vortices were marked in the atmosphere with
smoke and were penetrated by a jet airplane equipped
with a high-frequency angle-of-attack vane and a sen-
sitive total-pressure instrument. Photographs of the
trailing-vortex filaments were also made.

NACA TN 3380

STUDY OF EFFECTS OF MICROSTRUCTURE AND
ANISOTROPY ON FATIGUE OF 24S-T4 ALUMINUM
ALLOY. H. A. Lipsitt, G. E. Dieter, G. T. Horne
and R. F. Mehl, Carnegie Institute of Technology.
March 1955. 41p. diagrs., photos., 4 tabs. (NACA
TN 3380)

This report presents the results of an investigation
of the statistics of the effects of variation in micro-
structure (extruded and extruded plus recrystallized)
on the fatigue properties of 24S-T4 aluminum alloy
notched specimens tested in both the longitudinal and
transverse directions.

NACA TN 3390

SECOND-ORDER SUBSONIC AIRFOIL-SECTION
THEORY AND ITS PRACTICAL APPLICATION.
Milton D. Van Dyke. March 1955. 50p. diagrs.,
5 tabs. (NACA TN 3390)

Several recent advances in subsonic compressible
flow theory are combined into a unified second-order
theory for two-dimensional airfoils. Solutions are
given for a number of profiles, and are compared
with the results of other theories and of experiment.
A straightforward computing scheme is outlined for
calculating the pressures on any airfoil at any angle
of attack.

NACA TN 3391

FREE-FLIGHT MEASUREMENTS OF TURBULENT-
BOUNDARY-LAYER SKIN FRICTION IN THE PRE-
SENCE OF SEVERE AERODYNAMIC HEATING AT
MACH NUMBERS FROM 2.8 TO 7.0. Simon C.
Sommer and Barbara J. Short.   March 1955.   47p.
diagrs., photos., 2 tabs. (NACA TN 3391)

Measurements of average skin friction of the turbu-
lent boundary layer have been made in free flight at
high rates of heat transfer at high Mach numbers.
The results are appreciably higher than zero-heat-
transfer wind-tunnel data. The T' method for lami-
nar boundary layers, slightly modified, is shown to
agree with results of this and other investigations at
widely different Mach numbers and heat-transfer
conditions.

NACA TN 3399

A RAPID APPROXIMATE METHOD FOR THE
DESIGN OF HUB SHROUD PROFILES OF CENTRIF-
UGAL IMPELLERS OF GIVEN BLADE SHAPE.
Kenneth J. Smith and Joseph T. Hamrick. March
1955. 26p. diagrs., 3 tabs. (NACA TN 3399)

A rapid approximate method for the design of cen-
trifugal compressors of given blade shape with com-
pressible nonviscous flow characteristics has been
developed using techniques based upon stream-
filament theory. Axial symmetry is assumed, but
meridional-plane forces derived from tangential
pressure gradients are included. The method was
applied to the design of an impeller in order to de-
termine the approximate maximum meridional
streamline spacing that could be used. Three nu-
merical solutions for different streamline spacings
were made using the same hub profile, blade shape,
and prescribed velocity distribution along the hub.
The shroud profiles obtained from the three
solutions, which utilized 3, 5, and 9 streamtubes,
were negligibly different. The approximate comput-
ing time required was 15 hours per streamtube.

NACA TN 3400

ANALYSIS OF ERRORS INTRODUCED BY SEVERAL
METHODS OF WEIGHTING NONUNIFORM DUCT
FLOWS. DeMarquis D. Wyatt. March 1955. 40p.
diagrs. (NACA TN 3400)

Three typical duct flow profiles have been numeri-
cally analyzed to determine the errors introduced by
commonly used averaging methods in the resultant
uniform-flow properties. The analysis covers a
range of subsonic duct Mach numbers, but is con-
fined to flows having uniform static pressure and
total temperature. An averaging method is developed
which yields uniform properties that satisfy the inte-
grated mass and momentum of the nonuniform flow.
In contrast, it is shown that commonly used averag-
ing methods introduce inherent errors which may
markedly affect the validity of duct flow calculations.

NACA TN 3401

LAMINAR BOUNDARY LAYER BEHIND SHOCK
ADVANCING INTO STATIONARY FLUID. Harold
Mirels. March 1955. 25p. diagrs., 2 tabs. (NACA
TN 3401)

A study was made of the laminar compressible
boundary layer induced by a shock wave advancing
into a stationary fluid bounded by a wall. For weak
shock waves, the boundary layer is identical with
that which occurs when an infinite wall is impulsively
set into uniform motion (Rayleigh problem). A
numerical solution was required for strong shocks.
Velocity and temperature profiles, recovery factors,
and skin-friction and heat-transfer coefficients are
tabulated for a wide range of shock strengths.

NACA TN 3403

ANALYTICAL DETERMINATION OF EFFECT OF
WATER INJECTION ON POWER OUTPUT OF
TURBINE-PROPELLER ENGINE. Albert O. Ross
and Merle C. Huppert. March 1955. 29p. diagrs.
(NACA TN 3403. Formerly RM E9H17)

BRITISH REPORTS

An analysis is presented to show the effect of evaporative cooling of the charge air during compression on the performance of a turbine-propeller engine incorporating a centrifugal compressor. Calculations were made with water as the cooling agent for compressor tip speeds of 1200, 1500, and 1800 feet per second. Results indicated that a power augmentation of 200 percent is possible at a compressor tip speed of 1800 feet per second if sufficient water is evaporated during compression to saturate the air at the compressor outlet.

NACA TN 3404

THE COMPRESSIBLE LAMINAR BOUNDARY LAYER WITH FLUID INJECTION. George M. Low. March 1955. 29p. diagrs., 3 tabs. (NACA TN 3404)

A solution of the equations of the compressible laminar boundary layer including the effects of transpiration cooling is presented. The analysis applied to the flow over an isothermal porous plate with a velocity of fluid injection proportional to the reciprocal of the square root of the distance from the leading edge. Several examples are calculated, and the stability of the boundary layer is investigated. It was found that, on a weight-of-coolant basis, transpiration cooling is more effective than other methods considered.

NACA TN 3407

INTERACTION OF A FREE FLAME FRONT WITH A TURBULENCE FIELD. Maurice Tucker. March 1955. 55p. diagrs., 2 tabs. (NACA TN 3407)

Theoretical values are obtained for the root-mean-square flame-generated turbulence velocities and the attenuating pressure fluctuations resulting from a linearized interaction of a constant-pressure combustion front with a field of isotropic turbulence. The anisotropic flame-generated turbulence is found to be of about the same intensity as the incident turbulence. A brief discussion of turbulent flame speed is given. Directly at the flame front the noise pressure levels characterizing the pressure fluctuations are fairly intense (59 to 81 decibels) even at moderate approach-flow turbulence intensities.

NACA TN 3408

ONE-DIMENSIONAL CALCULATION OF FLOW IN A ROTATING PASSAGE WITH EJECTION THROUGH A POROUS WALL. E. R. G. Eckert, John N. B. Livingood and Ernst I. Prasse. March 1955. 29p. diagrs., photo. (NACA TN 3408)

A method is developed for the determination of the local wall permeability necessary to obtain a prescribed local distribution of ejected gas or for the determination of the local distribution of ejected gas resulting from a given local wall permeability. Sample calculations are presented for two blind radial passages of a rotating transpiration-cooled turbine blade. The effects of passage area variation, passage inlet pressure, and passage inlet Mach number are investigated.

N-36022*

Aeronautical Research Council (Gt. Brit.)
PUBLISHED REPORTS AND MEMORANDA OF THE AERONAUTICAL RESEARCH COUNCIL. 1954. 8p. (ARC R & M 2550)

N-36023*

Aeronautical Research Council (Gt. Brit.)
A WIND-TUNNEL INVESTIGATION OF ENTRY LOSS ON PROPELLER TURBINE INSTALLATIONS. PARTS I AND II. J. Seddon and A. Spence. 1954. 56p. diagrs., photos., 16 tabs. (ARC R & M 2894; ARC 11,602; ARC 11,883. Formerly RAE Aero 2252; RAE Aero 2281)

Part I describes tests on a series of models of annular entries, with and without propeller in the 5-foot tunnel, and tests on a set of large circular blade roots on a full-size nacelle in the 24-foot tunnel. Part II describes tests on models of a number of alternative ducted spinners for a typical engine, and for comparison, one annular entry similar to those tested in Part I. The work is confined to intakes for direct-flow engines with axial compressors. The conclusions on propeller losses can be applied to any form of annular intake.

N-36024*

Aeronautical Research Council (Gt. Brit.)
THE EFFECT OF UNIFORMLY SPACED FLEXIBLE RIBS ON THE STRESSES DUE TO SELF-EQUILIBRATING SYSTEMS APPLIED TO LONG THIN-WALLED CYLINDERS. E. H. Mansfield and M. Fine. 1954. 43p. diagrs. (ARC R & M 2832; ARC 10,983. Formerly RAE Structures 6)

The effect of discrete, flexible ribs has been investigated and the results have been incorporated in a number of graphs which show the effect of rib-flexibility in a long thin-walled cylinder of arbitrary shape under end constraint. Some of the results of these investigations are of a negative character in that they show that for certain types of end conditions the effect of rib-flexibility is negligible. But rib-flexibility is of paramount importance when self-equilibrating shear-distorting forces are applied to a cylinder and this report makes the stress distribution in such a case readily determinable.

N-36025*

Aeronautical Research Council (Gt. Brit.)
AN ANALYSIS OF N.A.C.A. HELICOPTER REPORTS. R. N. Liptrot. 1954. 61p. diagrs., 5 tabs. (ARC CP 183)

Theory is compared with flight and model tests in order to obtain empirical correcting factors which will enable reliable performance estimates to be made for new helicopter designs. A survey of general theory is followed by an analysis of certain American reports. Correcting factors for effective blade drag for tip speed ratio, compressibility, and stalling of the retreating blade are derived. A method of calculating the retreating blade tip angle of attack for twisted blades is presented.

N-36026*

Aeronautical Research Council (Gt. Brit.)
LOAD DIFFUSION IN PLASTIC STRUCTURES.
L. M. Tucker and R. B. Twiss. 1955. 79p. diagrs., photos., 14 tabs. (ARC CP 186)

This report describes theoretical and experimental investigations of the inherent advantages, in plastic structures, of resin bonded shear joints over comparable pin joints, and the most efficient material distribution for load diffusion. Theoretical analysis and graphical solutions are developed to obtain the ideal distribution of material for load diffusion; these have general applicability to structural design.

N-36073*

Royal Aircraft Establishment (Gt. Brit.)
HYDRAULIC FLUIDS, ETC.: THE DECREASE IN RATE OF FLOW ALONG TUBES OF A COLUMN OF LIQUID WHEN BROKEN BY AIR GAPS. G. F. N. Calderwood and E. W. J. Mardles. November 1954. 17p. diagrs., photos. (RAE Tech. Note Chem. 1242)

The loss of performance due to cavitation in a hydraulic system has been assessed by comparing observed times of flow with those calculated by means of the Poiseuille equation. Several air gaps of relatively small dimensions impart elastic and plastic resistance in addition to the normal viscous resistance so that the apparent viscosity may be several fold the bulk viscosity. An explanation of the increased resistance due to air gaps is attempted.

N-36075*

Royal Aircraft Establishment (Gt. Brit.)
USE OF RADIO-ACTIVE ISOTOPES FOR DETECTING FUEL CONTAMINATION OF AIRCRAFT STRUCTURES. B. F. A. Gatward, H. W. G. Wyeth and D. J. Nosworthy October 1954. 8p. diagr., tab. (RAE Tech. Note Mech. Eng. 191)

Previous methods of determining the areas of contamination of an aircraft structure from fuel spilt from the tanks in flight have not been satisfactory as their application has been difficult and the results obtained uncertain. This note describes a convenient method of tracing the spread of spilt fuel by using fuel treated with radio-active compounds. It records the results of an investigation in which the method was used successfully. It was found that the best results were obtained when the radio-activity of the fuel was approximately 300 microcuries per gallon.

N-36076*

Aeronautical Research Council (Gt. Brit.)
THE HOT-WIRE ANEMOMETER FOR TURBULENCE MEASUREMENTS. PART III. B. Wise and D. L. Schultz. March 24, 1954. 71p. diagrs. (ARC 16,679; FM 1527b; Oxford Univ., Engineering Lab. No. 69)

Further investigation of the operation of the hot-wire anemometer has shown that there are only two systems which are both statically stable and capable of improving the frequency response. A description is given of further experiments which have been made to verify the theory of operation of the wire, using both radio-frequency and direct current heating. An analysis of some feedback systems is given, and it is shown how these techniques may be used in the measurement of turbulence at high air speeds.

N-36077*

Aeronautical Research Council (Gt. Brit.)
NEUTRAL HOLES IN LATERALLY LOADED PLATES HAVING SMALL DEFLECTIONS. R. Hicks. April 26, 1954. 43p. diagrs., photos. (ARC 16,768; Strut 1707)

Reinforced holes which do not alter the stress distribution in a plate are said to be neutral. In this discussion it is shown that a circular neutral hole can be cut in a laterally loaded plate providing there is a choice for the cross-sectional dimensions of the reinforcement. General expressions are derived which enable the cross-sectional dimensions of the reinforcement to be obtained from the expression for the deflection surface of a similarly loaded plate which has no hole. For some particular load systems considered, expressions are found for the cross-sectional dimensions of rings reinforcing circular neutral holes in plates whose boundaries are circular, rectangular, triangular, and elliptical. These expressions are used to solve typical numerical examples and it is found for all the cases considered that the cross-sectional dimensions of the ring are always practical.

N-36080*

Aeronautical Research Council (Gt. Brit.)
THE PLANE STRESS DISTRIBUTION IN A PLATE CONTAINING A REINFORCED ELLIPTICAL HOLE. R. Hicks. April 26, 1954. 11p. diagrs. (ARC 16,769; Strut 1708)

The investigation deals with a reinforced elliptical hole in a rectangular plate having unequal applied principal stresses. It is shown that providing the ratio of the major and minor axes of the ellipse is suitably chosen, reinforcements of practical dimensions can be designed to give small stress concentrations.

N-36081*

Aeronautical Research Council (Gt. Brit.)
VISCOUS EFFECTS ON PITOT TUBES AT LOW SPEEDS. F. A. MacMillan. June 15, 1954. 8p. diagrs., 2 tabs. (ARC 16,866; FM 2081)

Measurements were made of the pressure in a blunt-nosed pitot tube in an air stream at Reynolds numbers of 15 to 1,000. The results are expressed in terms of a pressure coefficient. This pressure coefficient becomes greater than 1 at low Reynolds numbers, the increase being about 1-1/2 percent at a Reynolds number of 50 (based on external tube radius). No decrease of the coefficient below 1 was found at any Reynolds number. When the values of the coefficient are plotted against Reynolds numbers based on internal tube radius, it is found that the curves are in closer agreement than when the external radius is used.

N-36092*

Aeronautical Research Council (Gt. Brit.)
THE FLEXURAL AXIS OF THIN-WALLED SECTIONS THAT HAVE NO PLANE OF SYMMETRY. D. Williams and B. V. S. C. Rae. 1955. 6p. diagrs. (ARC R&M 2939; ARC 6871. Formerly RAE SME 3248)

A method of finding the flexural axis of unsymmetrical thin-walled sections is described that not only obviates the necessity for first finding the principal axes of inertia, but also simplifies the whole procedure.

N-36093*

Aeronautical Research Council (Gt. Brit.)
EXPERIMENTS IN THE COMPRESSED AIR TUNNEL ON SWEPTBACK WINGS INCLUDING TWO DELTA WINGS. R. Jones, C. J. W. Miles and P. S. Pusey. 1954. 26p. diagrs., 6 tabs. (ARC R&M 2871. Formerly ARC 11,354; Perf. 415)

Date are given relating to C_L, C_D, and C_m at high values of Reynolds number on wings of triangular plan form, and at angles of attack from $0°$ to above the stall. Increasing the radius of the leading edge did not yield an improved $C_{L max}$ vs. R curve.

Although the induced drag coefficient on the modified delta wing is somewhat less than on the original wing, the minimum-drag coefficient is greater.

N-36094*

Aeronautical Research Council (Gt. Brit.)
PRESSURE PLOTTING AND BALANCE MEASUREMENTS IN THE HIGH SPEED WIND TUNNEL ON A HALF-MODEL OF A 90-DEG-APEX DELTA WING WITH FUSELAGE. A. C. S. Pindar and J. R. Collingbourne. 1954. 59p. diagrs., 5 tabs. (ARC R&M 2844; ARC 12,804. Formerly RAE Aero 2335)

Tests were made on a delta wing that had a taper ratio of 0.143 and a wing section of RAE 102, symmetrical, 10 percent thickness/chord at 35 percent chord. The tests were conducted at a Reynolds number of 1.8×10^6 and Mach numbers up to 0.93. These tests were designed to provide data on the surface pressures over a delta wing at high subsonic speeds. For comparison, balance measurements were also arranged. The pressure distributions were the most accurate and reliable of the results given.

N-36128*

Aeronautical Research Council (Gt. Brit.)
THE EFFECT OF COMPRESSIBILITY ON ELEVATOR FLUTTER. D. E. Williams. 1954. 9p. diagrs. (ARC CP 185)

The effect of compressibility on elevator flutter is investigated by using two-dimensional control surface derivatives for Mach numbers of 0 and 0.7. It is shown that compressibility may have a considerable effect when the stick is fixed, but that the effect is small when the stick is free.

N-36129*

Aeronautical Research Council (Gt. Brit.)
APPROXIMATE WALL CORRECTIONS FOR AN OSCILLATING SWEPT WING IN A WIND TUNNEL OF CLOSED CIRCULAR SECTION. W. E. A. Acum and H. C. Garner. 1955. 23p. diagrs., tabs. (ARC CP 184)

The oscillatory interference upwash for a circular tunnel is derived from the corresponding steady upwash. Corrections to measured derivatives of a slowly pitching wing are calculated by Multhopp's lifting surface theory. A satisfactory approximate method using interference parameters for a small wing is given, and an extension to rectangular tunnels is suggested.

N-36203*

Forest Products Research Lab. (Gt. Brit.)
THE KNIFE-TEST METHOD OF ASSESSING BOND QUALITY IN PLYWOOD. R. A. G. Knight and L. S. Doman. December 1954. 17p. diagrs., photos., 4 tabs. (Forest Products Research Lab. AMP 26/1; PRP 13/1)

This report describes the procedure of knife-testing and the origin of the "Master Scale" by means of which bond quality can be given by numerical assessment. Questions are answered about the test such as the influence of species and the "force factor," and the strengths and weaknesses of the test are pointed out. An analysis is made of the knife-test data for variation.

MISCELLANEOUS

NACA TN 3409

Errata on "CHAIN BREAKING AND BRANCHING IN THE ACTIVE-PARTICLE DIFFUSION CONCEPT OF QUENCHING." Frank E. Belles and A. L. Berlad. February 1955.

DECLASSIFIED NACA REPORTS

NACA RM A50H24

FLIGHT CALIBRATION OF FOUR AIRSPEED SYSTEMS ON A SWEPT-WING AIRPLANE AT MACH NUMBERS UP TO 1.04 BY THE NACA RADAR-PHOTOTHEODOLITE METHOD. Jim Rogers Thompson, Richard S. Bray and George E. Cooper. October 27, 1950. 41p. diagrs., photos., tab. (NACA RM A50H24) (Declassified from Confidential, 3/11/55)

The characteristics of four different airspeed systems installed in a swept-wing airplane have been investigated in flight up to 1.04 Mach number by the NACA radar-phototheodolite method of airspeed calibration. The variations of static-pressure defect per unit indicated impact pressure with Mach number and a limited amount of information on the effect of airplane normal-force coefficient are presented for each system. The results are compared with available theory and wind-tunnel tests of the isolated heads.

NACA RM E50F29

SURVEY OF LESS-INFLAMMABLE HYDRAULIC FLUIDS FOR AIRCRAFT. Wray V. Drake and I. L. Drell. September 7, 1950. 64p. 14 tabs. (NACA RM E50F29) (Declassified from Confidential, 3/11/55)

A survey of current information on civil and military development of less-inflammable hydraulic fluids for aircraft is presented. Types of less-inflammable fluid reported include: glycol derivative, water base, silicone, ester, and halogenated compound. Specification requirements, physical and chemical properties, hydraulic-system test results, and advantages and disadvantages of various hydraulic fluids are discussed. For completely satisfactory service, some modification of currently available fluids or of present hydraulic-system parts still appears necessary.

NACA RM E53C12

THE DESIGN OF BRITTLE-MATERIAL BLADE ROOTS BASED ON THEORY AND RUPTURE TESTS OF PLASTIC MODELS. Andre J. Meyer, Jr., Albert Kaufman and William C. Caywood. April 6, 1953. 45p. diagrs., photos., tab. (NACA RM E53C12) (Declassified from Confidential, 3/11/55)

Theoretical design charts based on Neuber's equations for symmetrically located notches are presented for estimating the approximate rupture strengths of blade roots made from brittle materials. The limit of applicability of the theoretical charts is shown as determined by rupture tests of plastic models. The optimum proportions among overall root width, neck width, notch radius, and notch depth are determined from the design charts. Eighteen different root designs were investigated, their relative strengths were evaluated analytically and experimentally and the results were compared. A dovetail root having the optimum proportions as established by this investigation was the strongest root evaluated.